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ABSTRACT

The specific objectives of this study include a) the differences in knowledge of educational research among secondary school teachers when stratified on selected demographic variables, b) the differences in attitude of educational research among secondary school teachers, and c) the interaction between knowledge of and attitudes toward educational research. To rate the teachers' knowledge of educational research terminology, a 40-item test was devised. A test to assess teachers' attitudes toward educational research was developed for the study. The subjects were 204 secondary school teachers from western New York State who volunteered for the study. Data included a classification of sex; years of teaching experience; grade level; major subject area; and courses taken in research, measurement, or statistics. The results of the study indicate the value of course work in research, measurement, or statistics. it also identifies some variables which appear to be related to public school teachers' knowledge of educational research terminology and further suggests that attitudes may be independent of knowledge components of educational research. The data indicate that course work or participation in research has a significant effect on teachers' knowledge, but that this gain is not evident after 5 years, suggesting that teachers are not using the knowledge acquired. A bibliography of 12 items is included. (MBM)

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A STUDY OF SECONDARY SCHOOL TEACHERS' KNOWLEDGE OF AND ATTITUDES TOWARD EDUCATIONAL RESEARCH[1]

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RATIONALE FOR THE STUDY

In recent years there has been an increasing interest among people outside the field of education in the efficiency of the educational process and an increasing demand to have the process of education become more efficient. These interests have culminated in requests that educators exhibit increased accountability for the educational process (Lieberman, 1970). Three direct results of this emphasis are Project Talent, the National Assessment of Educational Progress, and the proliferation of 'performance contracting' (Martin and Blaschke, 1971).

While the classroom teacher has been held responsible for what happens in the classroom, he has generally not been required to justify his procedures and methods. It is entirely possible that teachers will be required to justify, with objective data, the educational advantages of one mode of instruction over another. It follows that teachers will be required to be sufficiently acquainted with current research in their field of interest and in general educational methods in order to be accountable for their choices of educational methods.

In addition to the accountability in the classroom, the teacher will need to know more about research to be better able to develop, implement, and objectively evaluate innovations in classroom instruction. Marland (1971), in discussing the proposed National Institute of Education, stated that one of the purposes was

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to undertake the invention and perfection of ways to deliver into the classroom those educational innovations which have been demonstrated to be successful. Dyer (1970) suggested that research agencies at the local level should be provided with data for generating and testing hypotheses concerning the improvement of all aspects of the educational program and that there should be strong incentives provided for every school system to experiment under controlled conditions. These statements by Marland and Dyer suggest a pressing need for teachers to understand basic research techniques and to be able to implement these techniques to applied classroom situations.

Authoritative opinions about teachers' knowledge of educational research, inspection of teacher certification programs, and analysis of tasks required of classroom teachers indicate little opportunity or reward for acquisition of such knowledge or skills.

Kerlinger (1960) stated that there was a general ignorance among educators about science and scientific research, concomitant with a negative and sometimes anti-intellectual attitude toward science and research.

In discussing the role of educational research in educational change, Guba (1967) cited four major deficiencies in relation to the role of research in informing and providing a knowledge base for educational improvement:

(1) lack of research information utilization,
(2) lack of adequate research to practice linking mechanisms,
(3) lack of adequate research training programs, and
(4) lack of adequate tools and strategies for implementing improvement programs.

McComas and Uxer (1968) asked students in a beginning graduate course in research to write an essay on 'What is Research?'. The concepts of research expressed by 149 students were categorized and tabulated. The results, though not statistically analyzed, indicated that only 7 out of 103 usable essays showed a fairly well-defined concept of research.

Krahmer (1967) investigated teachers' lack of familiarity with research techniques as it related to effective research dissemination. The sample for the survey was 794 North Dakota teachers and administrators and 500 American Educational Research Association Division D members. The procedure called for the subjects to read a research report and then respond to (1) a questionnaire about the appropriateness of the research procedures used and (2) questions requesting the respondents to indicate the sentences in the report which were the best example of a number of technical terms such as research design, method of sampling, validity and reliability of the evidence, population and sample, and others. Significant differences were found between the educators and AERA members, favoring the AERA members. Some pronounced differences between the educators and AERA members were a greater hesitancy by the educators to answer certain items, more neutral responses by the educators, and a greater checking by the educators of the 'Do Not Understand' option.

Attitude toward educational research has been considered a major part of the problem. Stiles (1968) stated, "Faith in research in one field can be transferred to another. However, the acceptance of educational research on a basis comparable to prevailing attitudes toward health research will not be automatic. It will have to be taught. A first step is for educators, themselves, to come to believe in research as a way to improve schools." (inside cover). Yamamoto (1968) supported this 'lack of faith' idea but suggested that it manifests itself in the negative attitude of "What is wrong with educational research?" Yamamoto encouraged a positive outlook toward educational research.

Ammons (1970) suggested there are two major categories of teachers' attitudes toward educational research: complete trust and fear. She clarified this by stating,

> "In general, there seem to be fewer teachers who believe in research to the extent that some portion of their own teaching behavior is strongly influenced by research findings. This appears to be true for a number of reported reasons. First, their preparation has not equipped them with the language, either standard or statistical, to read and interpret research. Second, they are not equipped through study of research design and statistics to engage in research themselves. Third, many are fearful that research, that of others and their own, will reveal weaknesses in their instructional programs. Fourth, many teachers see researchers as living 'in ivory towers', and their findings as unrelated to the real world." (p.32).

The authorities cited here seem to suggest that teachers have a limited knowledge of educational research and that teachers have a somewhat negative attitude toward educational research. This study was an attempt to quantify and either confirm or reject these opinions and to examine the relationship between knowledge of and attitude toward educational research.

OBJECTIVES OF THE STUDY

Specifically this study was designed to attempt to answer the following questions:

(1) Are there differences in knowledge of educational research among secondary school teachers when stratified on selected demographic variables?
(2) Are there differences in attitudes toward educational research among secondary school teachers when stratified on selected demographic variables?
(3) Are there any interaction effects between knowledge of and attitudes toward educational research when secondary school teachers are stratified on selected demographic variables?

METHODS

Knowledge of educational research terminology was measured by a 40-item test devised especially for this study called the Short Knowledge of Educational Research Test (SKERT). The content basis for the SKERT was established by extracting common research elements from representative textbooks on measurement,

basic statistics, and research; these elements were then judged by a panel of educational researchers. Standard procedures of test construction and revision were employed. The total test reliability determined by using the Kuder-Richardson #20 formula was 0.61. A group of practicing educational researchers scored significantly higher on the test than a group of relatively naive beginning educational research students.

Teachers' attitudes toward educational research were assessed with the use of a semantic differential instrument developed for the study. Eighteen bipolar adjective pairs were selected from 35 original pairs on the basis of high factor loadings on the concept of educational research. Eight concepts were retained in the final form including education, educational research, statistics, and others. The measure of each teacher's attitude was obtained from the evaluative factor derived from factor analysis of the educational research concept.

Secondary school teachers (N=204) from western New York State who completed the requested data forms on a voluntary basis during May of 1971 comprised the sample. In addition to the knowledge measure and the attitude measure, the following demographic data were obtained from the teachers: sex classification, years of teaching experience, grade level of teaching responsibility (7-12), major subject area of teaching, recency of a course in educational research, measurement, or statistics, and prior participation in research of any kind as a researcher.

The teachers' attitude (toward educational research) scores were analyzed using a series of one factor analysis of variance tests, with the selected demographic variables as the stratifying factors.

The teachers' knowledge of educational research scores served as criterion measures in a series of two factor analysis of variance tests. Attitude (toward educational research) scores served as one stratifying variable and each of the

selected demographic variables in turn was the other stratifying variable.

For the two factor analysis of variance tests, the teachers were stratified into three groups of approximately equal size, designated as high, middle, and low attitude toward educational research. Analysis showed that this classification resulted in three subgroups which were significantly different from each other.

RESULTS: ATTITUDE TOWARD EDUCATIONAL RESEARCH

The teachers' responses on the 18 bipolar adjective scales to the concept educational research were factor analyzed using a Principal Components Analysis. The matrix of factor loadings was then subjected to orthogonal rotation using Kaiser's Varimax criterion.

The factor analysis of the semantic differential data yielded eight adjective pairs comprising the evaluative factor. A teacher's total score on these eight scales was used as a measure of a teacher's attitude toward educational research. The 204 teachers in the sample had scores ranging from 11 to 56, with a mean score of 41.5 and a standard deviation of 9.5. There were 174 teachers with scores greater than 32.

Results of the statistical analyses are summarized in Table 1. It can be seen in Table 1 that there was a significant ($p < .05$) difference in the teachers' attitude scores when stratified by subject area of teaching. Subsequent analysis using the Scheffe' Method of Multiple Comparison (Glass & Stanley, 1970) revealed that the social studies teachers scored significantly lower than each of the other four groups.

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Insert Table 1 About Here

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There were no other significant differences across the other demographe used in this study when attitude served as the criterion variables.

RESULTS: KNOWLEDGE OF EDUCATIONAL RESEARCH

The knowledge of educational research scores, as determined by the SKERT, ranged from 7 to 30, (possible score was 40), with a mean score of 17.1 and a standard deviation of 4.5.

When the SKERT scores were used as the criterion variable, analysis of variance yielded a significant ($p < .05$) difference among the teachers when stratified by subject area of teaching. The Scheffe' Method of Multiple Comparisons revealed significant differences between mathematics teachers and: 1) social studies teachers, 2) English teachers and, 3) others teachers. All differences favored the mathematics teachers. The science teachers' scores were lower than the mathematics teachers' scores but higher than the scores of any of the other three groups; however none of these latter differences were significant.

There were significant ($p < .05$) differences among the teachers' knowledge of educational research scores when stratified according to having taken course work in: 1) educational research, 2) measurement, 3) statistics and, 4) by prior research experience as a researcher. These four separate analyses indicated that teachers having course work or experience more than 5 years ago scored nearly the same as those having no course work or experience, and the teachers having the course work or experience less than 5 years ago scored higher than these two groups, suggesting an inverted U-shaped distribution. It should be noted that the terms research, measurement, statistics, or research experience as a researcher were not defined and there may have been different bases used by the teachers when selecting their stratification category.

There were no other significant main interaction effects when the teachers were stratified on the other demographic variables.

CONCLUSIONS

The findings and conclusions of the present study need to be interpreted with caution due to the potential bias of the sample related to the voluntary participation of the teachers in the study.

If we assume the middle possible score (32) on the attitude measure represents a neutral attitude toward educational research, the sample used in this study has a positive attitude toward educational research. This particular finding, if valid, suggests that self-reported attitude toward educational research of secondary school teachers is relatively high, thus casting doubt upon the assertion that reduced attitude toward educational research is associated with the low level of public school teachers' research activity. The validity of this finding may be somewhat questionable because this sample of teachers also had high scores on their rating of the statistics concept.

A reasonable explanation for the difference in attitude toward educational research between the social studies teachers and the mathematics and science teachers is that training to teach these latter subjects is likely to involve a strong exposure to benefits and methodologies of research. The difference in attitude between social studies and English and other teachers is not so easy to explain. Further research will be needed to clarify this finding.

The significant difference in knowledge of educational research among the various subject area teachers and favoring the mathematics teachers might be expected because some of the terminology and knowledge tested is mathematically oriented. If the mathematics teachers have an edge in the mathematical terminology component, science teachers' presumed familiarity with experimental laboratory techniques may compensate so that both groups fare equally well on overall knowledge of educational research. This post hoc analysis could explain the non-significant differences observed between the science and mathematics teachers in this study. The specific reasons for the differences will need to be determined by further

research.

This study presents data to indicate that course work in educational research, measurement, and statistics, as well as participation in research, have a significant effect on teachers' knowledge of educational research; however, the knowledge gained is not evident after a period of five years has passed. This loss of knowledge over a period of time seems to indicate that teachers are not using the knowledge they have acquired. If a goal of developing research knowledge is adopted, secondary school teachers should be provided with the opportunity and the time to use the knowledge, experience, and background in educational research they obtain from their course work.

These results suggest the value of the course work in research, measurement, and statistics, as well as the participation in research by the teachers in determining the teachers' scores on the SKERT. This would seem to add further validity to the SKERT as a measure of knowledge of educational research.

There were no significant differences in knowledge of educational research when the teachers were stratified by their attitude toward educational research, suggesting that for this sample knowledge and attitude are unrelated.

The present study provides data which indicate there are no significant effects on the teachers' attitudes toward educational research when stratified by their experience and background in research. One implication might be that whatever else may have resulted, such as increased knowledge, from the teachers participating in these research related courses or in research, these experiences evidently did not influence the attitudes of the participating teachers.

SCIENTIFIC AND EDUCATIONAL IMPORTANCE OF THE STUDY

This study has identified some variables which appear to be related to public school teachers' knowledge of educational research terminology and further suggests that attitude may be high and independent of knowledge components of educational

research.

This information may be used as a basis for decision-making relative to increasing secondary teachers involvement in and awareness of research and research-related educational activities.

TABLE 1

F RATIOS RESULTING FROM THE ANALYSES OF VARIANCE

Stratifying Variable	Knowledge Scores		Attitude Scores
	Main Effect	Interaction: Attitude X..	
Attitude	.88[a]	--	--
Sex	.59	.07	.03
Years of Teaching Experience[b]	1.28	.69	.42
Grade Level[c]	.95	.87	.60
Major Subject Area[d]	5.84*	1.21	2.91*
Course in Educational Research[e]	3.23*	1.59	.19
Course in Measurement[e]	6.25*	.67	.39
Course in Statistics[e]	10.03*	.86	.77
Participation in Research[e]	3.95*	.58	.86

[a] Mean value for the eight analyses; no significant differences.

[b] Five levels of teaching experience: 0-5 years, 6-10 years, 11-15 years, 16-20 years, more than 20 years.

[c] Six grade levels: 7,8,9,10,11 and 12.

[d] Five subject area levels: English, Social Studies, Science, Mathematics, and Others.

[e] Five levels: No course work or experience; Yes, within past year; Yes, 2-3 years ago; Yes, 4-5 years ago; Yes, more than 5 years ago.

* $p < .05$; $.95F_{4,200} = 2.41$

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